

REMARKS

Claims 7-14 are pending. By this Amendment, Claims 7 and 11 are amended.
Applicant respectfully submits no new matter is presented.

Entry of Amendment is Proper

Entry of this Amendment is proper under 37 C.F.R. §1.116 since the amendments: (a) place the application in condition for allowance for the reasons discussed herein; (b) do not raise any new issues requiring further search and/or consideration on the part of the Examiner as Claim 7 is amended for cosmetic purposes and Claim 11 is amended to more clearly recite the feature of the silicon single crystal wafer being placed on a boat for heat treatment; (c) satisfy a requirement of form asserted in the previous Office Action; (d) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (e) place the application in better form for appeal, should an appeal be necessary. The Amendment is necessary and was not earlier presented because it is made in response to objections raised in the Final Rejection. Entry of the Amendment is thus respectfully requested.

Claims Recite Patentable Subject Matter

Claims 7, 8, 11 and 12 are finally rejected under 35 U.S.C. §103(a) as being obvious over Horai et al. (US 6,113,687) or JP 11-199385 (hereinafter "JP 385"). Claims 9, 10, 13 and 14 are finally rejected under 35 U.S.C. §103(a) as being obvious over Horai et al. or JP 385, in view of JP 11-195565 (hereinafter "JP 565"). Applicant respectfully traverses the rejections.

Applicant respectfully submits the Office Action misstates the standard for obviousness type rejections and that the rejections are improper for the following reasons.

Applicant respectfully notes the reasons provided by the Office Action in justifying both rejections is identical to the reasons provided in the previous Office Action dated October 10, 2003.

In particular, Applicant respectfully submits the Response to the October 10, 2003 Office Action, which was filed on January 12, 2004, argued Horai teaches an OSF ring formed at 0% to 70% of the radius of the single silicon crystal wafer measured from a center of the wafer and JP 385 teaches an OSF ring being formed inward of the periphery. Put simply, the January 12 Response argued Horai and JP 385 fail to teach forming an OSF ring at the periphery of a single silicon crystal wafer.

On pages 3-4, the instant Office Action asserts the Applicant's arguments in the January 12 Response were considered but deemed unpersuasive. In particular, the Office Action stated Horai teaches the OSF ring can be formed in the periphery of the silicon wafer. The Office Action also pointed out that the figures of Horai show the OSF ring can be formed at the periphery at certain pull rates. The Office Action then notes that although Horai prefers to place the OSF ring at a different section of the wafer, such a preference does not limit the overall teaching of Horai to the stated preferred embodiment. Accordingly, the Office Action maintains the position that the combined art of record, i.e., Horai and JP 385, teaches the claimed invention.

The Office Action further notes the applied art of record teaches the location of the OSF ring is varied merely by changing the pulling rates. Therefore, the Office

Action asserts any changes in the applied art would have been well within the skill of the art.

Moreover, the Office Action indicates the Applicant's arguments concerning the placement of the OSF ring recited by the pending claims not being obvious is not persuasive. In particular, the Office Action asserts Horai and JP 385 clearly teach that by changing pull rates and other parameters, the OSF ring can be formed in any place in the wafer cross section and the fact that the Applicant has a different reason for doing what is suggested by the Horai and JP 385 is not so demonstrative of unobviousness. Additionally, because the pending claims are silent as to the issue of slip dislocations, the arguments with regard to this feature are deemed moot as the applied art does not have to meet such unclaimed features.

Applicant has reviewed Horai and JP 385 in detail, as well as the Office Action's stated reasons for maintaining the rejections of Claims 7-14, and provides the following comments.

It is well known that to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine the reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art references must teach or suggest all the claim features. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the Applicants disclosure. See M.P.E.P. §2143 and In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991).

As noted in §2143.01 of the M.P.E.P., the applied art of record must teach, either explicitly or implicitly, the suggestion or motivation for combining or modifying the teachings of the applied art of record. Applicant respectfully notes that while Horai may teach the OSF ring can be formed at the periphery of the wafer, Horai fails to provide *any* suggestion or motivation to justify forming the OSF ring at the periphery of the wafer. Put simply, Horai does not provide *any* reason or motivation as to why one of ordinary skill in the art would desire placing the OSF ring at the periphery of the wafer. The fact that Horai teaches the wafer can be modified so that the OSF ring is formed at the periphery of the wafer is not sufficient to establish *prima facie* obviousness absent a suggestion in Horai or JP 385 to make such a combination or modification. See In re Mills, 916 F.2d 680 (Fed. Cir. 1990), in which the Federal Circuit held “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.”

Applicant respectfully notes the Office Action admits Horai and JP 385 fail to teach or suggest at least one portion of the silicon single crystal wafer has an OSF ring formed in a peripheral region of the crystal in contact with a boat on which the crystal is placed for heat treatment. Applicant also notes Horai and JP 385 lack any teaching or suggestion that the crystal wafer is heat treated while being carried on a boat. Hence, Horai and JP 385 lack any teaching that their crystal has an OSF ring portion in contact with a boat on which the silicon single crystal wafer is placed for heat treatment.

As explained by the Applicant in the originally filed application, the present invention forms the OSF ring in a peripheral region of the crystal that is in contact with a boat to prevent the slip dislocations formed at the point of contact from extending to the

surface of the wafer on the side opposite the side having the point of contact. See page 8, lines 14-24 and Figures 1(a) and 1(b) of the instant application.

Horai and JP 385 lack *any* teaching that slip dislocations are formed at the point of contact between the crystal wafer and a boat because they both fail to teach the wafer is in contact with a boat on which the crystal wafer is placed for heat treatment. Furthermore, Horai and JP 385 lack any teaching that formation of an OSF ring at a position corresponding to where the slip dislocations would be formed would prevent the slip dislocation from propagating from the point of contact, through the body or thickness of the wafer, to the surface of the wafer. As such, Horai and JP 385, alone or in combination, fail to provide the requisite suggestion or motivation to modify their teachings such that an OSF ring is formed in a peripheral portion of the crystal wafer that is in contact with a boat on which the wafer is placed for heat treatment. Accordingly, Applicant respectfully submits the Office Action has failed to establish *prima facie* obviousness of Claims 7 and 11.

JP 565 is cited for the disclosure of a nitrogen concentration of 1×10^{13} atoms/cm³ or more in a single crystal grown by Czochralski method and does not overcome the above-described drawbacks of Horai and JP 385.

Additionally, the Applicant respectfully notes the Office Action (see page 4) asserts the arguments in the January 12, 2004 Response with regards to the issue of slip dislocations are deemed moot since the claims do not recite such a feature and the art need not meet such unclaimed features. Applicant respectfully submits that the fact that the pending claims are silent as to the issue of slip dislocations does not render the arguments concerning the same to be moot since the Patent Office must consider the

"invention as a whole," and the results of the claimed manufacturing process are extremely relevant to the "invention as a whole."

For the above-provided reasons, Applicant respectfully submits that Claims 7 and 11 are not rendered obvious in view of Horai, JP 385, and JP 565, alone or in combination. Put simply, Applicant respectfully submits Claim 7 and 11 should be deemed allowable over Horai, JP 385, and JP 565.

Claims 8-10 depend from Claim 7 and Claims 12-14 depend from Claim 11. It is respectfully submitted that these six (6) dependent claims be deemed allowable for at least the same reasons Claims 7 and 11 are allowable, as well as for the additional subject matter recited therein.

Applicant respectfully requests withdrawal of the rejections.

Conclusion

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding rejections, allowance of Claims 7-14, and the prompt issuance of a Notice of Allowability are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing docket number 107242-00019.**

Respectfully submitted,



Murat Ozgu
Registration No. 44,275

Customer No. 004372

ARENT FOX PLLC
1050 Connecticut Avenue, N.W.,
Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810

GEO:MO/elp